The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Controllers and their Critics

WHEREVER two or three business men are gathered together stories are told of the impediments put in the way of trade by the war machinery of licence, restriction and control. These stories are legion and most of them ring true. A responsible journal would not be performing a useful service by quotations in detail; it is enough to call attention to their very wide circulation as they are proof of a deep-seated symptom which must be eradicated before this country can arrive at its full war-time economy.

Frank discussion of the unfortunate results of the early war legislation does not connote any wish to embarrass the Government. The Prime Minister and his chief colleagues had, in the national interest, to guard against innumerable risks, known and unknown. If the war so far has taken a different course from that which they had expected, they are certainly not to blame. Not a single industrialist or trader objected, in the early days of September, to making the Government trustee for most of his cherished liberties, notwithstanding the danger of grave dislocation of his own business. What, however, he did look for was a far quicker adaptation than has actually taken place to any situation radically different from that which the first emergency plans had been designed to meet.

There has admittedly been some amelioration, as in the fuel rationing scheme, railway facilities and shop lighting restrictions. Still, the process has not gone nearly far enough. It is good to hear from the President of the Board of Trade that the latest monthly tally of British exports has been restored to the pre-war figure. But that is not sufficient. British industry, with all manner of advantages including the complete stoppage of the German export trade, cannot rest until it sends abroad goods to the value at least twice the pre-war figure. Again, the distribution of raw materials is better than it was, but there are still too many irritating delays for the manufacturers to be in a position to say that they have achieved the utmost war effort of which they are capable.

The root of the trouble is that there has come into existence a new bureaucracy, which has led to the creation of fresh vested interests. It is notoriously easier to appoint a staff than to dismiss it, and hordes of officials are still harrying the business community from positions to which they would not have been appointed if the Government had had any foreknowledge of the conditions in which the war is being fought in the fourth month. The liquidation of this personnel ought to be much more rapid, regrettably painful though it may be to individuals. The far greater injury inflicted on the national interest by their retention makes it necessary that the most thoroughgoing sweep should be made.

What it needed more than anything else is a change of heart. All British experience shows that business thrives most when it is absolutely unfettered by official interference. Some regulation is admittedly necessary in war-time, but the system always functions best when the minimum of regulation is applied. This time the aim seems to have been to apply the maximum of regulation from the beginning, and the present confusion is the result. The free British economy can be relied upon in the last resort to defeat the German system of complete subservience to official authority. Nothing could be more fatal in the present struggle than to put British industry in the same fetters as those in which German industry is gripped. This country did not enter the war in order to fasten upon itself the totalitarian handcuffs of its enemy, but to ensure that its free economy, based on private enterprise, should be maintained for the happiness and prosperity of succeeding generations.

It is very important that these considerations should be placed on record, for they are the appropriate answer to the timorous folk who argue that any criticism of war-time machinery is unpatriotic and a positive embarrassment to the Government. On the contrary, British Ministers need all the help they can get from the people at large and from business experts in particular in order to make their war structure as fool-proof as possible. One of the war aims of the British people is to prove that no Government is infallible, and as long as bread and butter criticism of Downing Street and Whitehall is constructive and calculated to help rather than hinder Ministers in their tremendous task, it can and ought to be made.

CONTENTS

NOTES AND COMMENTS

Toxic Gases in Industry

THE Department of Scientific and Industrial Research has issued two further leaflets in the series describing standard methods for the detection of poisonous gases produced in industrial processes, dealing with phosgene (carbonyl chloride) and arsine (arsenic trihydride or arseniureted hydrogen) respectively. In the leaflet on phosgene (*Methods for the Detection of Toxic Gases in Industry, Leaflet No.* 8, published H.M. Stationery Office, price 2s. 6d. net) it is pointed out that this gas is made specially for use in certain industrial processes, particularly in the dyestuffs, organic-chemical and pharmaceutical industries. Atmospheres containing concentrations of phosgene only just detectable by smell or lachrymation and consequently easily "tolerable," may prove fatal. There is a risk of serious lung injury from exposure to a concentration, by volume, of one part in 30,000 for as short a period as two minutes and the maximum amount permissible for prolonged exposure is one part in 1,000,000. The standard method developed for the detection of this gas in industry consists of drawing a known volume of the atmosphere under test through a definite area of test paper (containing diphenylamine and *p*-dimethylaminobenzaldehyde) by means of a hand pump of specified capacity. The test paper becomes stained yellow or orange and the concentration is determined by comparing the stains with the standard colour chart supplied with the leaflet. Concentrations down to one part in 1,000,000 can be estimated by not more than 85 strokes of the hand-pump.

Detection of Arsine

ARSINE is dealt with in *Methods for the Detection of Toxic Gases in Industry, Leaflet No.* 9, *Arsine*, published H.M. Stationery Office, price 2s. 6d. net. Some of the situations in which it may be encountered in dangerous concentrations are works employing electrolytic processes or in the manufacture of zinc chloride and sulphate and the smelting of arsenical ores of iron, lead, zinc, cobalt, etc. It is also encountered in dyestuffs, electroplating, galvanising, hydrochloric acid and sulphuric acid works. There does not appear to be any limiting concentration at which this gas can be regarded as harmless for daily exposure and continuous work should never be permitted in an atmosphere in which the presence of arsine can be detected by the tests described in the leaflet. Exposure to a concentration of one part, by volume, in 20,000 for one hour is dangerous and a concentration of one part in 100,000 for 12 hours is fatal. The standard method developed for the detection of this gas consists of drawing a known volume of the atmosphere under test through a definite area of a test paper, treated with mercuric chloride, by means of a hand-pump of specified capacity and comparing the stains thus obtained with the standard colour chart supplied with the leaflet. Concentrations of arsine of 1 in 200,000-1 in 250,000 can be detected by means of 50 strokes of the hand-pump, an operation requiring only a few minutes to perform.

Mercury Vapour and Health

THE investigation of the U.S. Department of the Interior (Bureau of Mines) on mercury vapour risks in petroleum laboratories has led to some interesting and important conclusions. The use of liquid mercury in analytical laboratories, it is found, does not always result in the establishment of a definite health hazard because of mercury vapours. However, such use does represent a constant potential hazard that may result in cases of chronic mercurialism by reason of inadequate ventilation. The insidious nature of chronic mercurial poisoning enables it to progress almost free of symptoms up to a certain point; then suddenly the disease is precipitated. Prevention of the disease is therefore of paramount importance, and consists primarily in avoiding the inhalation of mercury vapours and dusts.

Laboratory Design

IN designing laboratories in which the use of mercury is contemplated, special thought should be given to selecting a type of wall and flooring that will not form natural traps for the retention of spilled mercury and mercury dusts. The work tables and equipment should be so arranged as to facilitate the removal of spilled mercury, and where careful methods of handling cannot entirely eliminate the exposure of liquid mercury, adequate, properly directed ventilation should be provided at all times. In present laboratories it may not be feasible to remove all liquid mercury accumulated through past spilling. However, methods should be adopted to eliminate future spillage as much as possible. In the older laboratories abundant ventilation is of even greater preventive importance than in laboratories properly designed for the use of equipment operating with liquid mercury. Since chronic mercurialism is contracted by continued exposure to low concentrations of mercury vapour, it is advisable to provide space away from the laboratory in which the results of the laboratory work may be calculated and studied. This plan would eliminate exposure to mercury vapour except when analytical or experimental work is actually in progress. Good habits of personal hygiene will help to counteract the harmful effects caused by the absorption of mercury vapour, and periodic medical and dental examination will aid in the detection of chronic mercurialism in its early stages. More specific recommendations relative to precautions against mercury vapour poisoning are included in an appendix to the Report (No. R.I.3475).

COUMARONE RESINS

The Cinderella of the Plastics Industry

By

HARRY BARRON, Ph.D., B.Sc., A.I.C., A.I.R.I.

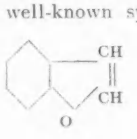
EARLY in 1937 the far-sighted leaders of the plastics industry, with commendable vision, organised a symposium to deal with the raw materials of the industry in the event of war. The object was to ensure the continuity of the activities of the industries in precisely such circumstances as have now arisen. There can be no doubt that except in one or two types of materials, the industry has benefited by this prescience. The chief exceptions are, of course, those synthetic materials which have only recently achieved commercial importance, mainly based on the vinyl compounds. It is common knowledge that our supplies of these materials derived from Germany and from the United States, but the raw materials could have been available locally had there been any production of carbide in this country. Unfortunately the strenuous efforts to inaugurate such production have not been successful, and consequently in these sections of the industry we must mark time.

There is, however, one group of plastics that has been consistently neglected, not even being considered in the review of the industry mentioned above. The omission of the coumarone resins is all the more singular since they derive from our outstanding chemical and industrial mainstay—coal. Nor is the production beset with the complications and pitfalls involved with many other synthetic resins. The coumarone resins have very wide industrial applications, which have not been fully appreciated in this country, and here the consumption is quite small, though they are widely used in the United States and in Germany. It is doubtful whether there is any cheaper synthetic resin.

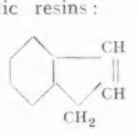
These resins can certainly be made in this country, although I am not aware that they are, and as, in the present circumstances, we must rely to a greater extent upon our own efforts, the time has surely come when the production of these products should be seriously considered. They are very variously useful; they are entirely derived from coal tar; and they may be obtained in forms ranging from thick, dark, semi-fluid resins to clear, very hard solids, depending on the composition. Coumarone resins are tacitly assumed to refer to the mixtures of coumarone, indene, and cyclopentadiene resins that invariably occur together. They are derived from coumarone, indene and cyclopentadiene, respectively, the resins being polymers of these products.

Nature of Coumarone Resins

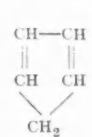
Coumarone is a colourless liquid, boiling at 172 deg. C. and with a specific gravity of 1.096, which was discovered by Kraemer and Spiller (Ber. *58*, 23, 1890), while they were working on coal tar distillates. They also obtained indene as a colourless liquid boiling at 182 deg. C., having a specific gravity of 1.0002. These monomers are unsaturated, and indeed their structure shows up features in which they resemble other well-known synthetic resins:



Coumarone



Indene



Cyclopentadiene

While indene and cyclopentadiene are hydrocarbons, and show marked affinities with other similar materials, coumarone itself is somewhat anomalous. It is an unsaturated cyclic oxide analogous to indene. By virtue of their unsaturated character these materials may be polymerised comparatively easily. They are all found together in distillation fractions of coal tar, notably in solvent naphtha. Although fractions richer in one or other can be obtained, there is some difficulty in carrying this too far. Again, separation of the pure materials from solvent naphtha is impracticable, and consequently polymerisation is actually carried out on such fractions.

As is invariably the case where pure monomers are not available, the polymers always have inherent disadvantages. It is axiomatic that commercial products must be available as clean, attractive materials wth definite characteristics. Hitherto in the manufacture of coumarone resins, though in many respects the production is comparatively simple, the great difficulty has been to remove the impurities that spoil the colour, odour, and other properties. This has recently been attributed to the presence of cyclopentadiene, by Carmody, Sheehan and Kelly (Ind. Eng. Chem. *30*, 235, 1938).

Catalysts are employed to promote the polymerisation. Particularly effective are the halogen compounds so widely employed for polymerisation and condensation reactions, such as aluminium chloride, boron trifluoride, stannic chloride, and phosphorus oxychloride. In the manufacture of coumarone resins, however, concentrated sulphuric acid predominates as catalyst. It is interesting to note that indene iself shows behaviour resembling that of styrene, for it can be polymerised by heat, by oxygen, and by ultraviolet light. In each instance, however, the presence of a catalyst accelerates the polymerisation. Polymerisation of indene can be closely controlled so as to yield regular polymers, such as dimers, trimers, etc.

Process of Manufacture

The starting material in the production of coumarone resins is solvent naphtha derived directly from coal tar. Present day practice is to employ the fraction boiling between 160 and 180 deg. C. This fraction is richest in coumarone and indene, contains fewest impurities, and yields a much better product than is obtained from a fraction with a wider boiling range. It is desirable to submit the naphtha to a preliminary treatment in order to dry it thoroughly. One method, introduced by Darrin (B.P. *132*, 229/1919) involves treatment with 0.5 per cent. concentrated sulphuric acid. By this, not only is the naphtha dried, but many impurities are resinified to tars, which, together with the acid, settle out and may be separated.

The actual polymerisation of the coumarone and indene is a carefully controlled process. Care is necessary if hard, clear, colourless resins are to be obtained. Concentrated sulphuric acid is the usual catalyst, stronger than that used in the preliminary process. The reaction is strongly exothermic. If the temperature rise is not checked, inferior discoloured products are obtained. To obviate this, the naphtha is thoroughly stirred and maintained at temperatures not greatly exceeding 0 deg. C. Actually about 1 per cent. concentrated sulphuric acid (1.84 specific gravity) is added to the stirred well-cooled solvent naphtha. The reaction is allowed to continue until the specific gravity of samples of the oil formed remains constant. Water is then added to the reaction mixture. Tars, various impurities, and sulphuric acid solution sink to the bottom and may be removed. The remaining solution is washed with sodium hydroxide solution, which also settles and is removed. There follows thorough washing with more water. The final stages involve removal of excess solvent naphtha, first by vacuum distillation, then by heating up to a temperature of about 275 deg. C. Any other volatile impurities are also removed.

Mention must be made of another interesting process of polymerisation, in keeping with modern trends. This is to

emulsify solvent naphtha together with a solution of the catalyst. By using this principle, Miller and Hill (B.P. *225, 216/1923*) were able to develop a continuous process, in which sulphuric acid was the catalyst, whereby reaction was actually completed within ten seconds.

By varying the conditions of polymerisation, a whole range of resins becomes available, each one having a different molecular weight. The members show singularly similar chemical behaviour, the chief variation being in melting point. The best commercial grades are pale yellow solids which are quite thermoplastic. Their resistance to heat is also good, decomposition only setting in at 275 deg. C. When these resins are strongly heated their characteristic odour becomes apparent. They are quite unsaponified and neutral, in spite of the presence of oxygen in the coumarone part of the resin. Alkalies, salts, and dilute acids have no effect upon them; they are chemically inert and very stable; and they have excellent electrical characteristics, possessing high breakdown strength, low power factor, and high dielectric strength.

Properties of Coumarone Resins

These resins are soluble in a very wide range of solvents, including the standard hydrocarbons, petroleum solvents, the chlorinated hydrocarbons, etc. They are also soluble in many types of esters, aldehydes, and ketones, and, with the outstanding exception of castor oil, in vegetable and animal oils, whether raw or treated. A gallon of solvent comfortably takes up about 7 lb. of resin; with larger amounts the solution becomes very viscous.

Another outstanding feature of the coumarone resins is the ease with which they mix with other binder materials, being compatible with almost every type of natural and synthetic resin. Thus they mix freely with ester gum, with alkyd resins, with phenolic resins and so on; yet they are also compatible with rosin, copals, etc. They are freely miscible with such synthetic resins as polystyrene, many of the polyacrylic ester type, and the polymethacrylic group. Yet another class of materials with which they blend perfectly includes chlorinated rubber, chlorinated diphenyls, and so on. In fact among standard commercial plastics, the cellulose ester group is the one really important exception. Ethyl cellulose and benzyl cellulose, on the other hand, mix quite well with the coumarone resins. As might be expected, coumarone resins mix quite easily with tars, pitches, asphalts, and bitumens in general. Although paraffin wax will not mix with them, many other waxes do, including carnauba, beeswax, ozokerite, and the chlorinated waxes. Easy dispersibility in rubber and synthetic rubbers is another factor of prime commercial importance.

Coumarone resins are excellent binding agents and adhesives. The lower polymers, semi-fluid, are intrinsically tacky, comparable with rosin in this respect. Either alone or in conjunction with some of the other binders already mentioned, they can bind large quantities of fillers such as wood flour, cork, and so on; they have not, however, been extensively used as the sole binder in moulding plastics because they are inherently brittle, and so far plasticisers have been ineffective in overcoming this disadvantage. The main applications of coumarone resins have always been in conjunction with other binding materials, in which they played the part, as it were, of a secondary binder; and generally these processes have been extended and considerably cheapened by their addition, acquiring at the same time some valuable new properties. Thus, quite a large use is in the production of so-called cold-moulded articles together with bitumens; articles such as battery boxes and electrical parts, in which the properties of the materials rather than the price-factor are a first consideration. Coumarone resins are employed with phenol-formaldehyde resins in moulding electrical parts. Injection moulding compositions have been made by incorporating them with polyvinyl acetal plastics. There is much interest, too, in their compositions with ethyl cellulose; compositions with polystyrene have interesting potentialities, and the same is true of mixtures with polyacrylic resins.

Their Use in Coatings

Coumarone resins find their greatest fields of application in the paint and rubber industries. They are widely employed in almost every type of coating. Not only do they confer improved properties on such coatings but they also enable economies to be effected. By virtue of their intrinsic properties they confer improved water resistance, greater resistance to chemical corrosion, and higher gloss upon varnishes. They also enhance their drying properties, abrasion resistance, and hardness. They can be cooked with the customary vegetable oils employed in making varnishes without being adversely affected by the high temperatures. For example, they are useful in making varnishes of different oil-lengths from tung oil, helping to retard the gelling of the oil. Obviously their ready solubility in cheap solvents further increases their value to the paint and varnish industry. Varnishes with coumarone resins are compatible with other varnishes, a feature of particular value in improving the chemical resistance of natural gum varnishes, e.g., containing congo, kauri, dammar, etc., which are notably lacking in this characterstic.

So far as fillers are concerned in the formulation of paints, coumarone resins present no obstacles. Their neutral character obviates any possibility of the livering of basic pigments and they assist in the dispersion of standard fillers. Apart from the general run of paints, they are extensively used as vehicles for metal paints, and also for finishes on concrete. Parallel with these applications, coumarone resins find extensive use in the formulation of printing inks.

The coumarone resins have a great future as accessories in nearly every type of synthetic coating. They are exceptionally useful in the preparation of chlorinated rubber finishes, not only lowering cost, but greatly improving the properties of the films. They have been employed to augment and to lower the cost of phenolic resin solutions in the production of laminated products. Their compatability with ethyl cellulose has already been mentioned; in consequence coumarone resins feature in ethyl cellulose lacquers. They are able to withstand baking processes, and are employed in finishes based on alkyd resins.

Use in the Rubber Industry

The other great field for coumarone resins is in the rubber industry. Here, at any rate, they have succeeded in making some impression in this country, though they are still underrated. They are extremely useful compounding ingredients for rubber. It is of some interest to note in this connection that sulphur dissolves in coumarone resin to the extent of about 12 per cent. Coumarone resins function as unusually effective softeners for rubber. They facilitate its processing at almost every stage of operation. The various grades of resin can be utilised to confer different properties according to the nature of the product desired. An obvious advantage of these resins is their neutral character, which is one reason why they do not in any way interfere with vulcanisation. Their inertness also precludes activity during the cure. It has been established beyond reasonable doubt that coumarone resins are not inimical to the ageing of the rubber, which gives them a strong advantage over many other softeners used with rubber. In particular they are rapidly ousting rosin, which has deleterious effects on ageing.

Among their outstanding applications in the rubber industry is their use in making tyre stocks, and they are widely used in making soles and heels, hose, rubber flooring, and so on. Although primarily their function is to act as softener, yet they also confer a bright glossy finish to moulded articles. In many of these applications harder resins of high melting point are used as fillers. By virtue of the tack that they impart, stocks containing coumarone resins are much used for making proofed fabrics and adhesive tapes. This tackiness combined with the ready solubility of resins makes them

highly suitable ingredients in rubber solutions. In the preparation of tyre carcases they are also of use. In the production of reclaimed rubber, not only for the standard alkali process and the less important acid process, but also in many newer methods, coumarone resins find scope, based on the fact that when treated they can disperse vulcanised rubber. As emulsions they have penetrated into the field of rubber latex; and by contrast they are used in making hard rubber.

In some respects it is even more significant that these resins are among the most effective softening materials for use with those commercial synthetic rubbers that have appeared in recent years. Interest in these resins has been stimulated by the fact that they are recommended strongly for use with neoprene. They are also used in the compounding of Thiokol and in the Bunas

I have outlined some of the leading uses of these versatile materials, but the account is far from exhaustive. They have penetrated into many other leading industries. For straightforward use as plastics coumarone resins have the disadvantages already described. But they are capable of modification; phenolic derivatives are already available, suggesting that there may be scope for development in this direction. It is surely clear that these resins deserve much more consideration in this country than they have hitherto been given. We are precluded from making very marked progress in the field of vinyl and related plastics since we have no raw materials. Rather than indulging in recriminations over the non-existence of a carbide industry, it would surely be better to turn our attention to materials which we can have in plenty—if we want them. Here is a field of chemical and industrial activity which would well repay concentrated efforts.

New Cleansing Apparatus

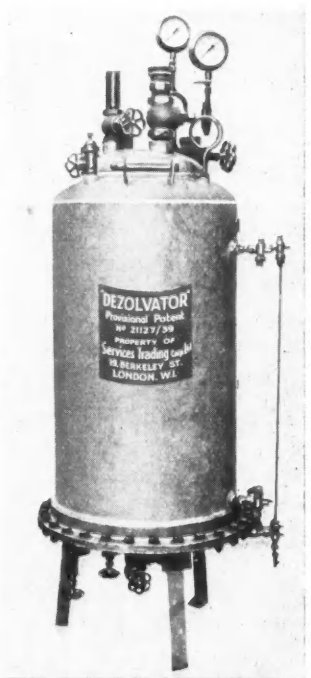
Rapid Removal of Viscous Deposits Effected

By

KENNETH S. LOW, A.R.S.M., A.M.I.Mech.E., F.C.S.

THE cleansing of vessels and appliances that have contained viscous, glutinous, or film-forming materials usually involves considerable expenditure of time and unproductive labour if they are to be maintained in a serviceable and efficient state. A novel appliance has lately been evolved which would appear to have extensive applications in degreasing, gas freeing, and film removal by solvent action in relation not only to such vessels as oil containers, bunkers, tank cars, and barges used in the transport and storage of chemicals and other substances chiefly of a hydrocarbon nature, such as tar, asphalt, bitumen, and heavy oils, but also in the cleaning and conditioning of pipelines, coils, jets, valves, oil-immersed pumps and electric transformers.

Apparatus for the operation of such processes forms the subject matter of recent patent applications and is known as the "Dezolvator." Tests and demonstrations recently carried out in this country have provided some remarkable figures, showing that treatments which would otherwise have taken days to complete have been effected to a considerably more efficient degree in a matter of minutes, or certainly in less than half an hour. The apparatus, which is compact and mobile, consists essentially of a pressure vessel having a capacity of about 70 gallons, and fitted internally with heating coils which may be connected to any steam or other heating supply. The vessel is divided in an annular manner so that its two compartments may be filled with similar or dissimilar solvents and other materials as required. By means of the heated coils, pressure is generated in the "Dezolvator," whereupon solvent substances are vaporised and may be controlled and led by suitable valves and pipeline to the vessel under treatment. Owing to a substantial pressure in the "Dezolvator" and a relatively low pressure (atmospheric) within the tank or other appliance being cleaned, the solvent is directed with great velocity to all sides and thus penetrates deposits on the walls, seams, and fittings, where it will condense and thus free the surfaces from oily matter. In cases where deposits are thick, hard, or oxidised, the process may have to be repeated, but as each operation is in the nature of a "shot," the total time involved is very small. The resultant sludge may be subsequently drawn off, and if desirable, filtered through cloth, after which the reclaimed solvent may be used again.



The new "Dezolvator" Cleansing Apparatus.

The solvents or mixtures of materials used in the apparatus will vary to some extent with the individual problem, but in no case need there be the slightest deleterious effect upon metallic surfaces, because no corrosive liquors are used.

The "Dezolvator" is of simple construction without any complex parts to maintain, no mechanical equipment other than a supply of steam is required, while labour for its operation is negligible. Further, as no steaming or preliminary treatment of vessels is necessary, local stresses or damage that might be caused by heat or mechanical methods are avoided.

In the course of a test witnessed by the writer, a 14-ton tank car in very bad condition, which had been in use over a period for tar, was effectively cleaned by this method in 20 minutes, the metallic surface being restored to a virtually unused state. It was gathered that an approximate approach to such condition by ordinary methods required two days' labour. Only eight gallons of solvents were used in this demonstration, but the actual loss was two gallons, six being recoverable for further use. In view of the striking results demonstrated, at such obviously low cost, the facilities offered by this novel appliance which can be made available either as a service or otherwise as arranged, should prove of the greatest significance to the oil, gas, chemical, engineering, paint, and transport industries. It is understood that the company which is operating the first mobile unit in this country is prepared to afford facilities for demonstration to those who have to deal with the problems indicated.

THE HUNGARIAN TREASURY has purchased for 630,000 pengo and taken over the antimony mines of Csucsom, from the Besztercebanya Antimony and Smelting Company. It is stated that the Treasury will first only undertake prospecting works in the mines, since the former owners have not been able to carry out the work owing to shortage of capital. The actual programme of ore-production will be of considerable importance not only to the home but also to the international market.

Luminous Pigments

Properties of Alkaline Earth Powders

AMONG the most effective luminescent substances now in use are those made from the sulphides of the so-called alkaline earths, calcium, strontium or barium. These are now being manufactured in this country in a convenient form under the name of Luminophore powders. The Luminophore Standard powders are visible up to a distance of about 100 yards in darkness, but beyond this range they are not visible. The advantage of this feature in connection with black-out conditions will readily be appreciated, as these materials may be used freely both for illumination and indication purposes without danger of detection beyond this range.

Luminophores are activated or charged by daylight or artificial light. The time required for full activation by exposure to strong daylight is five minutes. When the Luminophore is exposed to ordinary artificial light alone, a period of 20 to 30 minutes is required for full activation. The luminosity, or "after-glow" of these powders, is of high intensity and good length of life. Correctly applied, they should retain a steady luminosity, without recharging, for a period of about 25 hours.

These materials may be added to a leadless white paint with a neutral base and solvent. This has the effect of imparting a degree of luminosity to the paint, but care should be taken that the powders used are not masked by an excess of heavy covering pigment. The presence of the smallest trace of lead will cause a marked deterioration in the quality of the luminescence. Luminophores in proportions of 5 to 15 per cent. of the total pigment in the paint may be used. A considerable quantity of hydrogen sulphide may be released from the powders, particularly if they are exposed to a moist atmosphere, and this has a deleterious effect on vegetable oils, such as linseed, most natural gums and resins, shellac and gelatine.

The best results are obtained by using the powders as the sole pigment in a clear, neutral varnish. Approximately 40 per cent. of powder should be used in a transparent medium. The best media are those composed of synthetic plastic materials such as methyl acrylite, benzyl cellulose or chlorinated rubber, with such solvents as toluol, xylol, benzol or alcohol. Cellulose acetate may be used, but as many commercial supplies of this material are slightly acid, its use is not recommended if supplies of other more suitable materials are available. The surface to which the Luminophores are to be applied should, if not already white, be given an undercoat of leadless white, preferably zinc oxide or titanium white in a similar medium to that in which the Luminophore is carried. Two coats of the paint should then be applied and a suitable over-varnish added, in order to protect the paint from the action of moist air and atmospheric acids. A typical formula which gives good results is the following:—

Plastopal "H"	... ...	200 grammes.
Industrial Spirit	... ...	100 ,,
Palatinol "C"	... ...	100 ,,
Toluol	... ...	100 ,,
Xylol	... ...	400 ,,

Luminophores are supplied in powder form of sufficient fineness for most purposes and further grinding is not usually necessary. Where further grinding is desired the powder should be sieved to remove the finer crystals of the grade required and the coarser crystals should be covered with acetone or alcohol and slowly reduced in a mortar. The powder should never be ground in a dry state, and excessive grinding may result in a marked deterioration of luminosity.

For no application should the acidity of any material in contact with the powders be below *p*H 6. Alkalinity up to *p*H 10 has no effect on them. They are not affected by temperature up to 700 deg. C. and may be used in stoving enamels.

The most suitable colours for general use, where no continuous activation is available, are the Standard Green, Blue and Violet Luminophores. These provide an exceptionally long period of luminosity after charging. A further range of colours, red, orange, yellow and light green is, however, available; these have a greater initial intensity of luminosity, but a somewhat shorter after-glow, and are suitable for special purposes.

Detergent Solutions Examined

Protective Action of Sodium Phosphates

AS supplement to the article on *Textile Applications of the Phosphates*, published in our issue of October 28, a paper communicated by J. Powney and R. W. Noad to the *Journal of the Textile Institute* (*30*, 11, T157-171; Nov. 1939) is of particular interest. The paper deals with the significance of suspending power in detergent processes and the influence of various alkalies and long-chain detergents on the degree of deposition of suspended ilmenite particles on to cotton fabric has been studied under various conditions. Simple alkalies such as sodium carbonate and caustic soda were found to cause an increase of deposition which can be attributed to a sodium ion effect rather than to any *p*H effect

In contrast to this behaviour certain sodium silicates and phosphates exhibited a very considerable protective action, which is attributed to selective adsorption of the anion. In the case of sodium hexametaphosphate and sodium pyrophosphate the protective action was still appreciable at concentrations as low as 5-10 parts per million. With sodium laurate, sodium stearate and sodium oleate the optimum protective action is reached at concentrations which decrease rapidly with increasing chain length. The influence of added alkalies on the behaviour of soap solutions is also discussed. Detergents of the long chain alkyl sulphate type have been found to possess relatively low protective action.

Gas for Transport in Germany

Conversion of Private Lorries

A DECREE has been issued in Germany requiring that after a date to be specified all privately-owned motor lorries still allowed to operate must be converted to consume gas instead of liquid fuel. The decree has been issued as a further measure for economising in the use of imported or insufficiently produced domestic fuel and promoting the use of domestic substitute fuel available in greater abundance. The great majority of privately-owned motor cars and lorries have been removed from service as a means of reducing fuel consumption and only such vehicles are now allowed to operate as are indispensable for the carrying on of the war and maintaining the nation's economic life. By forcing the conversion of lorries remaining in operation from liquid to gas fuel, a further considerable saving in liquid fuel is expected. Reports from the U.S. Consulate General at Frankfort-on-Main indicate that efforts have been made to stimulate the use of ordinary gas produced from coal, such as illuminating gas, methane, etc., for transport fuel. These have not been very successful owing to the low calorific power of the fuel, the heavy weight and cumbersomeness of the requisite cylinders for carrying the fuel, the necessity of establishing costly filling stations, and other adverse factors. Such vehicles as are in operation in Germany using coal-gas as fuel operate over a narrow radius in very restricted regions.

Vinyl Polymerisation Products

Characteristics of Vinyon Fibre

SOME interesting data concerning Vinyon, the new textile yarn developed from research on vinyl polymers in America, are summarised in *Chemical and Metallurgical Engineering, 46,* 11, 682-3. This yarn possesses marked chemical inertness, and is available at the present time in such industrial fabrics as filtering cloths and in twines of various types.

Vinyon synthetic resin fibre and yarn represents one of three distinct types of vinyl polymerisation products developed since 1927, when the vinyl polymers were first produced commercially. Their first application was for moulded plastic products. A highly plasticised vinyl resin "sandwich filling" in a recently introduced safety glass represents the second type. The third vinyl polymerisation product—the yarn—begins as a white, fluffy powder. This product is a special grade of Vinylite resin, the copolymer of vinyl chloride and vinyl acetate.

Vinyon yarn is produced in two general forms, staple fibre and continuous filament. The latter is to be available in practically all deniers. It is a multifilament yarn, ordinarily with a filament denier considerably finer than silk, and possessing a number of unusually good characteristics. Both yarn and fabrics are non-inflammable and permanently water-resistant. The yarn can be produced at will with any tensile strength in the range of 1.0 to 4.0 g. per denier. Wet or dry, its tensile strength remains substantially the same. In addition, the yarn has a true elasticity comparable with silk—an unusual characteristic in a synthetic fibre.

Chemically the new yarn is relatively inert. At temperatures up to 150 deg. F. it is unaffected by mineral acids and alkalis except in high concentrations. It is dissolved by the lower ketones and certain halogenated hydrocarbons; it is swelled by ethers, esters and aromatic hydrocarbons; but it is unaffected by alcohols, glycol, or aliphatic hydrocarbons. It is not attacked by bacteria or fungi and will not support such growths.

Vinyon yarn is thermoplastic, a temperature of approximately 165 deg. F., being about the maximum that can be used without damage to the yarn. The "set" yarn, the type normally produced, is stable with respect to shrinkage up to the temperature of the set—usually 150 deg. F. Above the set temperature, however, shrinkage occurs, the yarn contracting in length a consistent amount for each temperature range. The shrinkage is accompanied by a slight reduction in tensile strength and a corresponding increase in elongation. Because the yarn becomes tacky at temperatures in the neighbourhood of 300 deg. F., it is useful as a bond in composite fabrics.

The shrinkage or crimpage of the yarn can also be controlled by a solvent-non-solvent bath. Thus, either such a bath or proper temperature control can be used to reduce "laddering" in knitted goods or thread slippage in woven goods. This characteristic is also of advantage in controlling the porosity of woven constructions such as industrial filtering fabrics.

The characteristics of Vinyon fibre have been investigated more thoroughly for industrial fabrics than for other possible uses. In one series of tests, fabrics of continuous filament yarn were made to correspond closely with several usual industrial fabrics in respect to porosity. The fabrics varied in weights all the way from 5.14 to 29.25 oz. per sq. yd., and included plain, twill, and chain weaves and napped fabrics. Since the practical heat limit to which the fabrics may be subjected is around 150 deg. F., sample fabrics were submitted to plants having mineral acid and alkali filtering processes at temperatures of that order.

Reports on the stability of the filter fabrics made from Vinyon yarn confirmed the belief that they had many possibilities for use in filtration. In a number of operations selected for experiment, the samples outlasted hair cloths, wool, and treated cotton fabrics. In addition, their resistance to moisture and mildew was found of value in applications where a high incidence of mildew occurred in fabrics of organic origin.

Because the yarn is thermoplastic, it is not, at present, generally recommended for clothing or similar purposes, unless compounded with other fabrics for special effects, but composite fabrics of the yarn show promise. A procedure for dyeing the yarn to any of a wide range of colours has been developed, and it can be delustred by incorporating a pigment in the spinning "dope."

New British Standards

Hydrated Lime and Lime-Cement Mortar

TWO further British Standard Specifications which have been recently published in the BS/ARP series relate to hydrated lime and mortar. The hydrated lime covered by BS/ARP 24 is intended for use in making a cement-lime mortar for bonding brickwork and masonry, and it provides for hydrated lime produced from high calcium quicklime or a greystone quicklime. Requirements have been specified for the chemical composition, the fineness and the soundness.

BS/ARP 25 for lime-cement mortar provides for a mortar to be used in the construction of air raid shelters in brickwork, natural or cast stone, or other structural units. The quality of the materials for making the mortar, i.e., the cement, lime and sand, is specified, and detailed instructions relating to four different methods of mixing which may be adopted, are laid down. Copies may be obtained from the British Standards Institution, 28 Victoria Street, S.W.1, price 3d. each, post free.

TETRACHLOROCARBAZOLE, m.p. 223-2° C., has been obtained by direct chlorination of carbazole in presence of carbon tetrachloride, while continued chlorination in presence of iodine gives the octochloro derivative, according to Zalkind and Komiarenko. J. App. Chem. (U.S.S.R.), 1939, p. 1134.

Letters to the Editor

Prevention of Silicosis

SIR,—In the interests of truth and the many workers who are compelled to inhale coal and allied dusts, please permit me to readjust or renovate the statement: "research has not yet discovered the clue to the prevention or treatment of the disease" referring to coal dust in mines in your leading article "Dusts and Industrial Safety" in your last issue.

The undersigned, in recent research, has been enabled to discover the clue to prevention for workers in mines, and particulars of the advance which covers essential requirements not hitherto found possible to provide for will be published shortly.—Yours faithfully,

S. C. BLACKTIN.

Leeds, December 11.

THE GERMANS are organising a systematic robbery and plunder of Poland, says a correspondent of *The Times.* The famous Institute of Experimental Physics in Warsaw, which was the pride of Warsaw University, has now been totally demolished. The German Government have sent a special committee of German professors who have dismantled the whole installation of this institute and all the instruments for scientific research have been sent into the Reich.

Chemical Service in War-Time

I.C.I. Support Trade Press

THE first war-time luncheon meeting of the Incorporated Society of British Advertisers was held at the Holborn Restaurant last week, Mr. G. E. Sandland, chairman, Trade, Technical and Vigilance Committee, presiding. Nearly 100 members attended.

Mr. Sidney Rogerson, publicity manager, Imperial Chemical Industries, Ltd., made some interesting remarks on the chemical industry in war-time.

"It is a peculiarity of the chemical industry," he said, "that without being in any sense munitions of war, its products do in war-time at once become munitions of war. We can leave out of account such obvious things as explosives or explosive-making chemicals. Think instead of all the chemicals used as raw materials in the making of textiles, iron and steel and rubber, to give three examples. The bulk of these are required at once for Government orders on the outbreak of war. It is generally true to say that in war the problem of the chemical industry is not how to sell most of its products but how to supply them to its regular customers. A new customer, Government, demands the bulk of the output. What is left over must be rationed fairly amongst the independent customers so that at the same time the best interests of the community are served, and the goodwill of the producer safeguarded as far as possible.

With fewer travellers on the road, Mr. Rogerson pointed out, "the situation arises that just when many customers may be getting discontented with their rationed supplies, there are fewer people to call on them and explain why rationing is necessary. At the same time shortage of paper and restrictions on circularisation tend to cut down the other channel of explanation to customers—leaflets, booklets, etc." These were the two main justifications for advertising in the trade Press in war-time. Manufacturers could—and I.C.I. were going to do so—use its columns to explain their position to their customers and so help to preserve the goodwill of their name over the period of the war.

"The trade Press," he continued, "is an institution whose worth many of us may be apt to minimise. It performs a highly valuable service, not only by supplying the platform for the discussion of trade topics, but by gathering up and relaying trade information and helping to keep manufacturers abreast of new developments at home or overseas. By spending money in the trade Press the big firm can help to continue the service the paper gives to the smaller units, and also set the example." Support of the reputable trade journal was, therefore, a duty.

New Government Orders

Mercury and Mercurial Compounds

IN pursuance of Regulations 55 and 98 of the Defence Regulations, 1939, the Minister of Supply has issued the Control of Mercury (No. 2) Order, 1939, dated December 5, 1939. This Order amends the Schedule to the Control of Mercury Order, 1939, dated October 3, 1939, which laid down maximum prices for certain mercury compounds. The increased prices now authorised are due to the marked advance in the price of mercury metal since the issue of the original Order.

Copies of the new Order, which came into operation on December 7, 1939, may be purchased from H.M. Stationery Office, or through any bookseller. Inquiries should be addressed to the Ministry of Supply (Code HA), Raw Materials Department (Mercury Control), Shell-Mex House, Strand, London, W.C.2.

Trading with the Enemy

The Board of Trade have made an Order amending previous Trading with the Enemy (Specified Persons) Orders. The new Order, which is called the Trading with the Enemy (Specified Persons) (Amendment) (No. 3) Order, came into force on December 1, and copies may be obtained from H.M. Stationery Office, or through any bookseller.

The original Order directs that 278 persons or firms carrying on business in various foreign countries shall be deemed to be enemies for the purpose of the Trading with the Enemy Act; later amending Orders made various additions and deletions, and the new Order makes 109 additions, six deletions and 16 amendments. Among the names newly added, the following may be of interest to the chemical industry: S. A. La Quimica Bayer, S. A. Cia. General de Anilinas, both of Lima, Peru; Quimica "Bayer" Westkott y Cia, and Quimica Schering Colombiana, S.A., both of Bogotà, Colombia; Westkott y Cia. "Bayer," of Montevideo, Uruguay; D-VoZa Prodashba na Germanski Anilinovi Boi, and Stickstoffe Kali Syndikat, both of Sofia, Bulgaria; and "Bayer" Yakuhin Gomei Kaisha, and Chemia Uberseehandels Co., both of Tokyo, Japan (and branches).

Traders, shipowners and others are accordingly warned that it will be unlawful to transact business or to have other dealings with any person specified in the original Order, as amended by the three Amendment Orders, without official permission (which will not be granted save in very exceptional circumstances). Offenders will be liable to heavy penalties.

Import and Export Regulations

Modifications in Belgium and France

THE *Moniteur Belge* contains a notice of the Ministry of Finance by virtue of which the increased Customs duty of 70 francs per 100 kg. gross on gas oil is suspended until further notice. In the meantime the customs duty reverts to 10 francs per 100 kg. gross. Drawback will be allowed on any duty already paid at the higher rate. As from December 4 a duty of 40 francs per 100 kg. is imposed on nitrate of lead. A further decree, operative as from December 1, subjects to permit the exportation of limestone and other stone for making cement, lime or the like, not calcined.

Electrodes for electric furnaces, electrolysis, batteries or other uses are added to the list of restricted exports from France.

TWENTY YEARS AGO

IN its issue of December 13, 1919, THE CHEMICAL AGE warned the British chemical industry that among the points demanding its attention was the steady advance of chemical industry in the United States

"During the war the U.S. Chemical Warfare Service was organised on a large scale," stated THE CHEMICAL AGE, "and while in this country the war work of British chemists is jealously guarded as a State secret, in America the results of experimental work and the lessons gained in works organisation have for months past been made public for the benefit of American chemical industry. Over there both the Government and the commercial class understand the meaning and value of publicity. In addition, the lavish scale on which research work is being endowed may be gathered from the description of the new laboratory building and equipment just opened at Pittsburgh, costing about a million dollars, while the tendency in this country is rather to curtail our expenditure on education. These movements are bound to tell, and it would be folly for the chemical industry of Great Britain not to take note of them."

PERSONAL NOTES

MR. G. F. N. BATTLE, who has joined the board of the British Sugar Corporation, Ltd., has been appointed an additional executive director.

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MR. ARTHUR PURVIS, president and managing director of Canadian Industries, Ltd., has been appointed chairman of the Anglo-French Board, which, under arrangements concluded recently between the British and French Governments, will purchase war supplies in the U.S.A.

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TEMPORARY arrangements for the Department of Chemistry at Cambridge University during the vacancy in the Professorship of Chemistry caused by the death of Sir William Pope include the appointment of DR. H. MCCOMBIE as temporary director of the laboratory of general and organic chemistry. The general administration of the department of chemistry has been assigned to a committee consisting of PROFESSOR R. S. HUTTON (chairman), PROFESSOR E. K. RIDEAL, PROFESSOR LENNARD-JONES, PROFESSOR NORRISH and DR. MCCOMBIE.

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MR. J. B. DUNN (Champion Druce & Co., Ltd.) has been elected chairman of the British Colour Makers' Association. The vice-chairman is Mr. J. CROMBIE (James Anderson & Co. (Colours), Ltd.) and the hon. treasurer, Mr. C. J. A. COWAN (Cowan Bros. (Stratford), Ltd. The constitution of the Council is as follows :—James Anderson & Co. (Colours), Ltd. (Mr. J. Crombie), Lewis Berger & Sons, Ltd. (Mr. H. Ralph), British Dyestuffs Corp., Ltd. (Mr. P. R. Koekkoek), Champion Druce & Co., Ltd. (Mr. J. B. Dunn), Cornbrook Chemical Co., Ltd. (Mr. H. G. Ferguson), Golden Valley Ochre and Oxide Co., Ltd. (Mr. A. H. Orchard), W. H. Holmes & Sons (Mr. S. W. Greig).

OBITUARY

MR. WILLIAM STOKES, governing director and founder of Stokes and Sewell, Ltd., lace dyers and bleachers, of Wilford Road, Nottingham, has died.

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MR. THOMAS HENRY LLOYD, F.I.C., who at the time of his retirement was vice-chairman of Cooper, McDougall & Robertson, Ltd., died recently at his home at Thorpe.

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MR. THOMAS BARDSLEY, who died last week, was a director of Jopson, Bardsley and Jopson, Ltd., dyers and bleachers, Carr Dyeworks, Nelson, and retired from active participation in the business about three years ago

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MR. ELI KIRKHAM, of Darwen, who died last week at the age of 85, was for 46 years chief salesman and a director of the East Lancashire Soap Co., Clayton-le-Moors, and for 42 years a director of the Darwen Paper Mill Co.

General News——From Week to Week

IMPERIAL CHEMICAL INDUSTRIES, LTD., announce that a statement that has appeared in the Press to the effect that they have decided to return to their London office is incorrect. No such decision has been made.

PETER SPENCE AND SONS, LTD., have temporarily removed from their London offices at 810-812 Salisbury Road, Finsbury Circus, E.C.2, to 4 Hangar Green, Ealing, W.5, to which all communications should be sent. Telephone : Perivale 4409.

AMONG CONSIGNMENTS of interest which have found their way into the Port of London recently are cargoes of molybdenite concentrate, copper cathodes, gilsonite (a mineral rubber used for varnishes and insulating), quebracho, gum damar and Vetivel oil. Items which the Port authorities quote as being entirely unfamiliar to them are consignments of chrysalis oil and bales of tula ixtle.

IT IS ANNOUNCED that the Lily Hill Dyeing Co., of Whitefield, have purchased the bleaching, dyeing and finishing works at Simpson Clough, Heywood, which closed down about three months ago. The works will be used for khaki dyeing. Some workers will be transferred from Whitefield, but it is expected that as many of the former employees as possible will be re-engaged. The Whitefield works are to be kept in full operation.

MEMBERS OF THE LIVERPOOL SECTIONS of the British Association of Chemists, the Society of Chemical Industry and the Institute of Chemistry held a joint meeting at Liverpool on Thursday last, when a series of short lectures on the Chemistry of Colour was given. Mr. G. C. Corbett, of the B.A.C., presided. Dr. F. W. Kay discussed "The Chemistry of Photosensitisers," with special reference to the discovery and preparation of cyanin pigments. Dr. Kay considered that the precise nature of photosensitisation was empirical and not easily correlated with the chemical nature of the pigments. Mr. M. Rosebery, of High Speed Steel Alloys, Ltd., Widnes, spoke on "Colour Photography," and Mr. L. Wild, of Tillotsons, Ltd., Liverpool, dealt with "Colour Printing," with mention of the important work done recently on the nature of lithographic printing surfaces, where absorbed films of fatty acid and gum arabic played a vital part in the acceptance and rejection of ink as required on the plate.

RESTRICTIONS on the importation into the Netherlands of superphosphate, calcium hypochlorite and raw animal fats, have been withdrawn.

SPRING WATER BLEACHWORKS, of R. and A. Chambers, Ltd., Whitefield, which has been on short-time for a considerable period, is being closed down by the Bleachers' Association.

THE DEPARTMENT OF OVERSEAS TRADE has now removed from 35 Old Queen Street, S.W.1, to the New Public Offices, Great George Street, S.W.1, where all inquiries should now be addressed. The telephone number will remain Whitehall 9040.

A SPECIAL JOINT MEETING of the Society of Chemical Industry (London Section and Plastics Group) was held on Tuesday, December 12, at 2 p.m., at the West Ham Municipal College, Romford Road, Stratford, E., when a paper was presented by N. J. L. Megson and K. W. Pepper of the Chemical Research Laboratory, Teddington, on "Plastics from Coal."

REPRESENTATIONS have been made to the Chancellor of the Exchequer by the Commercial Motor User's Association urging that steps be taken to relieve owners of commercial motor vehicles of the liability to additional licence duty when a trailer, constituting a gas producer plant, is drawn. The Association draws attention to the fact that the Government favours the development of gas producer units for use with motor vehicles in order to reduce the consumption of petrol, whilst at the same time enabling the carriage of goods by road to be maintained, used economically and efficiently.

AS A WARTIME MEASURE the Council of the Institute of Metals has decided that all candidates for membership whose applications are found to be in order, and are received before noon on February 8, will have the privilege of an extra four months' membership. A candidate's next subscription—following his initial payment—will not become due, therefore, until July 1, 1941. The present great activity in the metallurgical and engineering worlds is resulting in a large number of membership applications being received by the Institute, which is maintaining—and even increasing—its activities (with the exception of those of a social character). The necessary membership application forms can be obtained on application to the Secretary, Mr. G. Shaw Scott, 4 Grosvenor Gardens, London, S.W.1.

As an emergency measure, Ronald Trust and Co., Ltd., have moved their offices from 1-3 Brixton Road, London, S.W.9, to their new works at Slough. This arrangement is now permanent.

The fifteenth annual Buyers' Guidebook number of *Chemical Industries*, dated October 25, is a remarkable volume of some 660 pages. It contains a wealth of valuable information including a complete buying guide for all sorts of chemical supplies, chemical prices, a list of associations and societies, a directory of manufacturers, importers and local distributors, etc.

The annual dinner-dance of the various Birmingham Chemical Organisations will be held at the Midland Hotel, Birmingham, on January 20, when the chief guest will be Professor J. C. Philip, F.R.S., president of the Society of Chemical Industry. The latter organisation opened its session on November 24, when Dr. W. J. Hickinbottom spoke on "War Gases and Their Identification." On Thursday, December 7, there was a joint meeting with the Plastics Group, when Mr. E. G. Couzens, B.Sc., spoke on "Some Aspects of Cellulose." On January 26, Mr. T. L. Garner will speak at a joint meeting with the Institution of Chemical Engineers on "The Importance of Synthetic Rubber," and on February 22, Capt. R. H. Atkinson will give the Jubilee Memorial Lecture on "Recent Advances in the Applied Chemistry of the Rarer Metals."

At a meeting of the Institution of Chemical Engineers, held in the rooms of the Geological Society, Burlington House, London, W.1, on Tuesday, Professor D. M. Newitt read a paper on "The Theory of Gas Compression and Circulation." Mr. F. Heron Rogers, President of the Institution, was in the chair. The paper read was intended as a supplement to Mr. R. L. Quertier's paper, read at the Institution meeting on March 14, giving an exposition of modern gas-compressor practice. Professor Newitt's paper dealt with the theoretical aspects of the subject, with special reference to their bearing on the design of compressors and circulating pumps for high pressures. In both cases an accurate estimate, based on thermodynamic and hydrodynamic considerations, has to be made of the energy requirements of the operation of the apparatus.

At the recent annual meeting of the British Colour Makers' Association it was decided that war-time problems relating to raw materials and similar matters made it necessary to sever the long standing connection with the National Paint Federation and make separate provision for the secretarial work of the Association. After careful consideration it was decided to apply for affiliation to the Association of British Chemical Manufacturers and to ask that body to undertake the secretarial work in the same way as it does for a number of its other affiliated associations. At the meeting, Mr. J. B. Graham was presented with a gold wristlet watch as a token of appreciation of his work as secretary. The new secretary is Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers, and the new address of the Association is 166 Piccadilly, London, W.1.

Members of all three societies in Bristol and the S.W. Counties are informed that an Emergency Joint Committee, representing the Chemical Society, the Institute of Chemistry and the Society of Chemical Industry, has been formed to arrange meetings as far as circumstances permit. In this way it is hoped to prevent duplication of effort and to enable the members of all three Societies to take advantage of such meetings as may be arranged. All chemists who may be temporarily in the district are cordially invited to attend, and are requested to send their addresses to either of the Honorary Secretaries, so that they may be kept informed of future arrangements. Fellows of the Chemical Society should write to Dr. E. B. Maxted, The University, Bristol, 8. The joint honorary secretaries are: (Institute of Chemistry), F. P. Hornby, B.Sc., F.I.C., 64 Falcondale Road, Westbury-on-Trym, Bristol; (Society of Chemical Industry), Arthur Marsden, M.Sc., F.I.C., "Carn Brea," Bishop Road, Bishopston, Bristol, 7.

Foreign News

A new quota of crude sodium nitrate of 40,000 tons is to be allowed into Italy free of customs duty before March 31, 1941.

A gradual reorganisation is being carried out of the extraction on an industrial basis and exportation of the potassium salts of Dallol (Dancalia), in Italian East Africa. It is hoped that these supplies will, in time, render Italy completely self-supporting in potassium salts.

Reports from Norway announce that A/S Borregaard of Sarpsborg have closed a contract with the State Wine Monopoly for the delivery of 500,000 litres of wood alcohol (methanol) per annum for technical use in addition to the 1,000,000 litres which have been delivered formerly. A further expansion of this production is probable.

Sulphur exports from the Netherlands Indies, it is reported, dropped to 3,589 tons last year, from 4,725 metric tons in 1937. The principal market is S. Africa which took 1,930 tons in 1938, while British India took 893 tons; Ceylon 221 tons; Germany 128 tons; Denmark 125 tons; Italy 112 tons; Holland 105 tons; other countries 75 tons.

With last September's shipment of 1,023,754 lbs. of coal-tar colours, dyes, stains and colour lakes, the United States exports of dyes during the first nine months of 1939 was brought to a total of 7,776,556 lbs., an increase over the 6,413,827 lbs. shipped out during the corresponding period of 1938. September shipments of 490,000 lbs. in 1938 were more than doubled in 1939 when over 1,000,000 lbs. were exported, these going principally to Canada, Latin America and China.

The Chemical Division of the U.S. Department of Commerce reports that with a September, 1939, production of 9,435,000 gallons, the total U.S.A. benzol output for the first nine months of 1939 registered 68,813,000 gallons. This figure represents a decided increase over the similar period in 1938, which was 48,841,000 gallons, according to data compiled by the Bureau of Mines and estimated from the production of coke at by-product ovens which reported recovering this commodity. The figures given represent gallons of crude and refined benzol plus motor benzol.

The only producer of zinc white in Sweden, Svensko Metallverken at Västeras, recently discontinued the manufacture of zinc white, on account of foreign competition. Poland, Germany, Great Britain, and Netherlands were the leading countries for Sweden's supply of zinc white, but on account of present difficulties in securing supplies, reports indicate that consideration is being given to resuming the production of zinc white in Sweden. Imports of zinc white into Sweden for 1937 were 7,312 metric tons, in 1938 7,980 metric tons.

At the annual meeting of the Union Chimique Belge, the president, Baron Emmanuel Janssen, stated, *inter alia*, that over 500 of the company's employees had been called to the colours, and that this had, naturally, created some difficulties. The question of supplies was also very difficult. The present international situation had led to a rupture of international agreements, among them the nitrogen agreement. Efforts made to reconstitute these agreements between neutral countries had so far proved encouraging. So far as the company's funds were concerned, receipts had suffered from stoppages; raw materials had to be paid for in cash, while sales still took place on credit.

The Soft Soap Sales Company, of which most of the Swedish soap factories are subsidiaries, has announced that because of the limited supply of raw materials, it is forced to ration deliveries of soft soap to its customers. A national commission investigating the country's available supplies has found that considerable quantities of substitute materials, including pine oils, are available locally. The Swedish Cellulose Company is erecting a plant for the manufacture of soaps using pine oil as a base, which, together with the plant already producing this type of soap, will have a combined annual output of 7,000 metric tons. Annual consumption of soaps in Sweden is between 30,000 and 33,000 metric tons.

According to statistics supplied by the New Zealand Department of Agriculture, exports of phosphate rock from Nauru and Ocean Islands for the year ending June 30, 1939, increased to 1,224,517 tons, compared with 1,166,100 tons in 1937-1938. Total exports have increased steadily for some years, although the current increase is smaller than in previous years. Phosphate-rock exports for the year ending June 30, 1938, and 1939, with the countries of destination, are given in tons, as follows:

Country.	1937-1938	1938-1939
United Kingdom	15,650	61,500
Australia	771,150	818,020
New Zealand	290,300	293,047
Japan	67,650	29,450
Sweden	7,450	15,150
Finland	13,900	7,350

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

METHOD FOR REACTING tertiary hydrocarbons and olefines.—Standard Oil Development Co. (United States, Nov. 12, '38.) 29469.

TREATMENT OF PAPAYA.—A. H. Stevens (International Papaya Corporation). 29477.

APPARATUS FOR HEATING MOULDABLE MATERIALS.—A. H. Stevens. (Reed-Prentice Corporation). 29476.

HYDROLYTIC DECOMPOSITION of titanium salt solutions.—Titan Co., Inc. (United States, Nov. 3, '38.) 29252.

MANUFACTURE OF AZO PIGMENTS.—H. J. Twitchett and Imperial Chemical Industries, Ltd. 29301.

CHROMIUM METALLURGY.—M. J. Udy. (United States, Dec. 8, '38.) 27391.

CHROMIUM RECOVERY.—M. J. Udy. (United States, Jan. 25.) 27392.

UREA-FORMALDEHYDE ADHESIVES.—Aero Research, Ltd., and C. A. A. Rayner. 29772.

COMPOSITIONS OF FATTY OILS and synthetic resins.—Bakelite, Ltd. (United States, Nov. 16, '38.) 29776.

PROCESS FOR THE MANUFACTURE of acetic esters of starch.—Calico Printers' Association, Ltd., J. R. Whinfield, and G. G. Ritchie. 29896.

METHOD FOR THE PRODUCTION of green pigment from chrome scutch.—R. B. Drew. 30068.

PRODUCTION OF ALIPHATIC COMPOUNDS.—H. Dreyfus. 29959.

PROCESS AND APPARATUS for the production of filaments.—E. I. du Pont de Nemours and Co. (United States, Nov. 10, '38.) 29841

PROCESS AND APPARATUS FOR THE MANUFACTURE OF SPUN STRUCTURES.—E. I. du Pont de Nemours and Co. (United States, Nov. 10, '38.) 29842.

MANUFACTURE OF THIOINDIGOID DYESTUFFS.—E. I. du Pont de Nemours and Co. (United States, Nov. 12, '38.) 29945.

TREATMENT OF TEXTILES.—E. I. du Pont de Nemours and Co. (United States, Nov. 14, '38.) 29946.

MANUFACTURE OF SOLUBLE DERIVATIVES OF ACETYL SALICYLIC ACID. G. M. Dyson, and Genatosan, Ltd. 29726.

PROCESS FOR THE PRODUCTION OF BENZINE or its homologues.—Gas Light and Coke Co., R. H. Griffith, and J. H. G. Plant. 29729.

METHOD OF MAKING MOULDED CERAMIC ARTICLES.—General Motors Corporation. (United States, Nov. 29, '38.) 29931.

PROCESS FOR THE MANUFACTURE OF SALTS of cinchona alkaloids with ascorbic acid.—F. Hoffman-La Roche and Co., A.-G. (Switzerland, Dec. 2, '38.) 29803.

PROCESS FOR THE ENRICHMENT OF VITAMIN-E ACTIVE COMPOUNDS. F. Hoffman-La Roche and Co., A.-G. (Switzerland, Nov. 30, '38.) 29804.

PRODUCTION OF CONDENSATION PRODUCTS of the furylmethane derivative type.—P. C. Kruyff, and A. Van Hoboken and Co. 29903.

MANUFACTURE OF PIGMENTS FOR PAINTS, ETC.—Manchester Oxide Co., Ltd., J. H. Clayton, and B. Bann. 29792.

PROCESS FOR THE ALKYLATION OF ISO-ALKANES.—N. V. de Bataafsche Petroleum Maatschappij. (Holland, Nov. 22, '38.) 29724.

POLYMERISABLE VINYL KETONES.—Norton Grinding Wheel Co., Ltd. (United States, Nov. 15, '38.) 29835.

PREPARATION OF MAGNESIUM CHLORIDE from sea water.—Ocean Salts (Products), Ltd., and B. A. Adams. 29950.

PRODUCTION, ETC., OF ACID SOLUTIONS.—Permutit Co., Ltd., and J. G. Milton. 30062.

ANTI-CORROSIVE PIGMENTS for the protection of metals, etc.—L. Renault. (France, Dec. 9, '38.) 30158.

MANUFACTURE OF FIRE-BRICKS.—Soc. Anon. des Hauts-Fourneaux de la Chiers. (France, Nov. 22, '38.) 29971.

MANUFACTURE OF DERIVATIVES of the saturated or unsaturated pregnane-series.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 15, '38.) 30044.

PRODUCTION OF TOLUENE from crude benzole.—South Metropolitan Gas Co., H. Stanier, and J. E. Davis. 29737.

COMPOUNDED MINERAL OIL.—Standard Oil Co. of California. (United States, Nov. 21, '38.) 30163; (United States, Nov. 25, '38.) 30164.

MANUFACTURE OF NORMALLY LIQUID HYDROCARBONS by alkylation. Standard Oil Co. of California. (United States, Dec. 7, '38.) 29936; (United States, Dec. 30, '38.) 29937.

CATALYTIC TREATMENT OF HYDROCARBONS.—Standard Oil Co. of California. (United States, Dec. 23, '38.) 30128.

GAS-PRODUCERS ON VEHICLES.—Vauxhall Motors, Ltd., and A. Taub. 29873.

COMPOSITIONS OF NATURAL AND/OR SYNTHETIC RUBBER and fibrous materials.—J. M. Wright, and Wondegrip Products (Holdings), Ltd. 29719.

PRODUCTION OF SYNTHETIC RESINS.—A. Abbey (Dow Chemical Co.). 30308.

MANUFACTURE OF CALCIUM CARBIDE.—D. Bagley and C. L. Boucher. 30362.

LUMINESCENT PRINTING or analogous processes.—L. Berger and Sons, Ltd., S. B. Baldwin and L. E. Wakeford. 30390.

Complete Specifications Open to Public Inspection

COLOURED BITUMEN DISPERSION, and process for its manufacture. Colas Products, Ltd. April 22, 1938. 30544/38.

EMULSIFIERS AND THE PRODUCTION OF EMULSIONS.—A. Herlow. March 17, 1938. 8589/39.

METHOD FOR THE PRODUCTION OF HYDROGEN.—M. W. Kellogg Co. April 18, 1938. 10556-7/39.

MANUFACTURE OF INTERPOLYMERS containing methacrylic acid and of water-soluble salts thereof.—E. I. du Pont de Nemours and Co. April 16, 1938. 11636/39.

PRODUCTION OF ARTICLES OF REGENERATED CELLULOSE.—G. Bolognesi. April 18, 1938. (Cognate Application, 11710/39.) 11709/39.

INJECTION-MOULDING.—Celluloid Corporation. April 22, 1938. 11814/39.

PROCESS FOR THE MANUFACTURE OF ALIPHATIC NITRILES.—I. G. Farbenindustrie. April 20, 1938. 11820/39.

CONTAINERS FOR SERVING-OUT PLASTIC MATERIALS, and a filling vessel for the same.—J. Szekely. April 20, 1938. (Cognate Application, 11837/39.) 11836/39.

PROCESS FOR THE MANUFACTURE OF CARBOXYLIC ACIDS of the cyclopentanopolyhydrophenanthrene series. — Schering A.-G. April 21, 1938. (Cognate Applications, 11944-7/39.) 11943/39.

PROCESS FOR THE MANUFACTURE OF OIL SOLUTIONS of hormones. Schering, A.-G. April 21, 1938. 11948/39.

Specifications Accepted with Date of Application

METHOD OF PRODUCING OIL from fat-containing protein material. L. T. Hopkinson. Feb. 2, 1937. 514,424.

MANUFACTURE OF ORGANIC CARBONYLIC ACID COMPOUNDS of metals. L. W. E. Townsend. Feb. 7, 1938. 514,470.

EXTRACTION OF BERYLLIUM COMPOUNDS from beryllium ores.—Seri Holding Soc. Anon. March 20, 1937. 514,471.

MANUFACTURE OF MEDIUM for carrying pigment material.—Oxvar, Ltd. (Oxford Varnish Corporation). April 8, 1938. 514,479.

MANUFACTURE OF DECORATIVE COATING-MATERIALS.—Oxvar, Ltd. (Oxford Varnish Corporation). April 8, 1938. 514,480.

CATALYSTS, and processes of preparing and using the same.—B. Malishev. May 3, 1938. (Convention date not granted.) 514,485.

PRODUCTION OF VALUABLE HYDROCARBON OILS by destructive hydrogenation of solid carbonaceous materials.—H. E. Potts (N. V. Internationale Maatschappij voor Hydreerings-Technik en Chemie (International Hydrogenation Engineering and Chemical Co.)). May 4, 1938. 514,389.

DESTRUCTIVE HYDROGENATION OF SOLID DISTILLABLE CARBONACEOUS MATERIALS.—H. E. Potts (N. V. Internationale Maatschappij voor Hydreerings-Technik en Chemie (International Hydrogenation Engineering and Chemical Co.)). May 4, 1938. 514,487.

PRODUCING BACTERIAL PRODUCTS or bacteria strains.—Soc. of Chemical Industry in Basle. May 19, 1937. (Cognate Application, 13284/38.) 514,397.

MANUFACTURE OF PERFUMES.—I. G. Farbenindustrie. June 15, 1937. 514,398.

REMOVAL OF CARBON DEPOSITS in apparatus for generating and utilising gaseous products of combustion.—Eclipse Aviation Corporation. May 5, 1937. 514,404.

DECARBONISATION OF CARBON-CONTAINING METALS and ferro-alloys.—I. Rennerfelt, and B. M. S. Kalling. May 5, 1937. 514,491.

MANUFACTURE OF COMPOUNDS of the aetiocholanic acid series.—Soc. of Chemical Industry in Basle. May 5, 1937. (Cognate Application, 13423/38.) (Addition to 482,321.) 514,437.

MANUFACTURE OF IMIDAZOLINES substituted in 2-position.—Soc. of Chemical Industry in Basle. May 7, 1937. (Cognate Application, 13425/38.) (Addition to 460,528.) 514,411.

MANUFACTURE OF CYCLIC KETONES.—R. Robinson. May 5, 1938. 514,516.

MANUFACTURE OF 2-MERCAPTOBENZIMIDAZOLE ARSINE OXIDES.—W. W. Groves (I. G. Farbenindustrie.) May 6, 1938. 514,417.

MANUFACTURE OF TRIARYLMETHANE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) May 6, 1938. 514,450.

PREPARATION OF *p*-ISOPROPYL-α-METHYL-HYDROCINNAMIC ALDEHYDE. Soc. des Usines Chimiques Rhone-Poulenc. June 29, 1937. 514,452.

MANUFACTURE OF TRIARYLMETHANE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) May 9, 1938. 514,531.

Weekly Prices of British Chemical Products

THERE are no outstanding changes to record in the general chemical market, and the volume of business being transacted is about normal for the season. Price conditions on the whole are steady with higher rates obtainable in some directions as a result of scarcity in supplies. Contract deliveries are reported to be good, but so far as new forward business is concerned dealers are reluctant to take on fresh commitments. The makers spot prices for nitrogen fertilisers show a slight increase on a minimum 6-ton lot basis with quotations for forward delivery discontinued. The chief feature in the market for coal tar products has been the steady demand for carbolic acid. Quotations for the crude 60's are dearer at 3s. 3d. to 3s. 6d. per gallon and crystals are now quoted from 10d. to 10½d. per lb. Xylol is also higher with the commercial being quoted at 2s. 8d. to 2s. 11d. per gallon. In other directions prices are firm with a slight improvement in the general demand.

MANCHESTER.—New contract prices over the early part of next year for a wide range of the leading heavy chemicals are expected within the next few days. In the meantime, although deliveries against old contracts are proceeding steadily, it is difficult to buy even odd lots in the free market and extremely high prices in connection with such sales have been reported in Manchester during the past week. With regard to the tar products, taking the market as a whole a fair amount of buying interest is being displayed, with refined tar, exceptionally, a quiet spot. Values are firm throughout the range, and, in the case of pyridine, a further strengthening of the position has been reported this week.

GLASGOW.—The steady volume of business experienced in recent months in the Scottish heavy chemical market continues unabated with prices firm in all products and with very little tendency to decrease. Liquid rosin has eased recently, but this does not represent the general tendency of rosins. Epsom salts are scarce, but considerable activity has been evident with yellow and white dextrines.

Price Changes

Rises: Ammonium Phosphate Fertilisers, Ammonium Sulphate, Concentrated Complete Fertilisers, Copper Sulphate, Mercury Products, Naphthalene (purified crystals), Pyridine (Manchester), Salammoniac (dog-tooth crystals).

*In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been included.

†Benzol prices remain nominal, owing to doubts concerning the control position.

General Chemicals

ACETIC ACID.—Maximum prices per ton: 40% technical, 1 ton or over, £15 12s.; 10 cwt. and less than 1 ton, £16 12s.; 4 cwt. and less than 10 cwt., £17 12s.; 80% technical, 1 ton, £29 5s.; 10 cwt./1 ton, £30 5s.; 4/10 cwt., £31 5s.; 80% pure, 1 ton, £31 5s.; 10 cwt./1 ton, £32 5s.; 4/10 cwt., £33 5s.; commercial glacial, 1 ton, £37; 10 cwt./1 ton £38; 4/10 cwt., £29; delivered buyers' premises in returnable barrels.

ACETONE.—Maximum prices per ton, 50 tons and over, £39; 10/50 tons, £39 10s.; 5/10 tons, £40; 1/5 tons, £40 10s.; single drums, £41 10s., delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

AMMONIUM DICHROMATE.—1s. per lb. d/d U.K.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—99/100%, about £25 per ton, ex store.

BARIUM CHLORIDE.—90/100%, prime white crystals, about £11 per ton when available, in casks, ex store; imported material would be dearer.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX, COMMERCIAL.—Granulated, £20 10s. per ton; crystal, £21 10s.; powdered, £22; extra finely powdered, £23; B.P. crystals, £29 10s.; powdered, £30; extra fine, £31 per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £64; powder, £65; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £34 10s. per ton; crystal, £35 10s.; powdered, £36 10s.; extra finely powdered, £38 10s.; large flakes, £47; B.P. crystals, £43 10s.; powdered, £44 10s.; extra fine powdered, £46 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£7 5s. to £11 per ton, ex wharf. Granulated £7 to £9 per ton according to grade and locality.

*CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 3¾d. per lb.; liquor, £19 10s. per ton d/d station in drums

CHROMIC ACID.—10¾d. per lb., less 2½% d/d U.K.

CHROMIC OXIDE.—1s. 1d. per lb., d/d U.K.

CITRIC ACID.—1s. 1½d. per lb. MANCHESTER: 1s. 2½d.

COPPER SULPHATE.—MANCHESTER: £25 10s. per ton f.o.b.

CREAM OF TARTAR.—100%, £5 2s. to £5 7s. per cwt., less 2½%.

FORMALDEHYDE.—40% by volume, £22 to £23 per ton, according to quantity, in casks, ex store.

FORMIC ACID.—85%, £42 per ton for ton lots, ex store, in cylinders; smaller parcels quoted at 45s. 6d. to 47s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 11s. 2d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £30 10s. per ton; 50% by weight, £35; 80% by weight, £60; pale tech., 50% by vol., £36; 50% by weight, £42; 80% by weight, £67. One ton lots ex works; barrels returnable.

LEAD ACETATE.—LONDON: White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £34 10s.; 10 cwt. to 1 ton, £34 5s.; 1/2 tons, £34; 2/5 tons, £33 10s.; 5/20 tons, £33; 20/100 tons, £32 10s.; over 100 tons, £32 per ton, less 2½ per cent. carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £44 10s.; 5/15 tons, £40 10s.; 15/25 tons, £40; 25/50 tons, £39 10s.; 50/200 tons, £39 per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £52 10s.; 5/10 cwt., £51 10s.; 10 cwt to 1 ton, £51; 1/2 tons, £49 10s.; 2/5 tons, £48 10s.; 5/10 tons, £46 10s.; 10/15 tons, £45 10s.; 15/25 tons, £45; 25/50 tons, £44 10s.; 50/100 tons, £44 per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 7s. 5d.; bichloride lump, 8s.; bichloride ammon. powder, 8s. 11d.; bichloride ammon. lump, 8s. 9d.; mercurous chloride, 8s. 11d.; mercury oxide, red cryst., B.P., 10s. 3d.; red levig. B.P., 9s. 9d.; yellow levig. B.P., 9s. 7d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £25 to £30 per ton, according to strength, quantity and destination.

OXALIC ACID.—£48 5s. per ton for ton lots, ex wharf, in casks, smaller parcels, 53s. to 57s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d per lb

POTASH, CAUSTIC.—Liquid, £25 to £30 per ton.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

POTASSIUM DICHROMATE.—5¾d per lb. carriage paid. GLASGOW: 5¾d. per lb., carriage paid.

POTASSIUM IODIDE.—B.P., 9s. 10½d. per lb. in 7 lb. lots; for not less than 1 cwt., 7s. 9d. per lb.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.
POTASSIUM PERMANGANATE.—B.P. 1s. 3½d. per lb.; commercial, 143s. per cwt., d/d.
POTASSIUM PRUSSIATE.—Yellow, about 1s. 8d. per lb., supplies scarce.
SALAMMONIAC.—Dog-tooth crystals, £42 per ton; medium, £38; fine white crystals, £16; in casks, ex store.
SALT CAKE.—Unground, spot, £3 15s. per ton.
SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £13 10s. per ton d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£25 to £26 per ton, ex wharf.
SODIUM BICARBONATE.—About £10 10s. per ton, in bags.
SODIUM BISULPHITE POWDER.—60/62%. £12 10s. to £14 per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.
SODIUM DICHROMATE.—Crystals cake and powder, 4¾d. per lb. net d/d U.K. with rebates for contracts. GLASGOW: 4¾d. per lb., carriage paid.
SODIUM HYPOSULPHITE.—Pea crystals, £15 15s. per ton for 2-ton lots; commercial, £11 15s. per ton. MANCHESTER: Commercial, £11 10s.; photographic, £16.
*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4¼d. to 5¼d. per lb.
SODIUM SILICATE.—£8 2s. 6d. per ton.
*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
*SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £3 15s.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £13; commercial, £9 10s.
*SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 2¼d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 3¼d. per lb.
ZINC OXIDE.—Maximum prices: White seal, £23 10s. per ton; red seal, £21 d/d; green seal, £22 10s. d/d buyers' premises.
ZINC SULPHATE.—Tech., £12 10s., carriage paid, casks free.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 9½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.
CARBON DISULPHIDE.—£25 to £30 per ton, according to quantity, in free returnable drums.
CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 3d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5¼d. to 6d. per lb.
LITHOPONE.—30%, £16 15s. per ton.
SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.
VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.
ZINC SULPHIDE.—£56 per ton ex works.

Plus 5% War Charge.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—£7 17s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.
NITRO-CHALK.—£7 14s. per ton, in 6-ton lots, d/d farmer's nearest station.
CONCENTRATED COMPLETE FERTILISERS.—£11 18s. to £12 4s. per ton in 6-ton lots, d/d farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£11 14s. to £16 6s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

†BENZOL.—At works, crude, about 1s. 0¾d. per gal.; 90's, 1s. 7d. to 1s. 9d.; pure, 1s. 10d. to 2s. MANCHESTER: Crude, 1s. 0½d. per gal.; pure, 1s. 10½d. per gal.
CARBOLIC ACID.—Crystals, 10d. to 10½d. per lb.; Crude, 60's 3s. 3d. to 3s. 6d., according to specification. MANCHESTER: Crystals, 9¼d. to 10d. per lb., d/d; crude, 3s. 6d. to 3s. 9d., naked, at works.
CREOSOTE.—Home trade, 5½d. per gal., f.o.r., makers' works; exports 6d. to 6¼d. per gal., according to grade. MANCHESTER: 4½d. to 6½d.
CRESYLIC ACID.—99/100%, 2s. 9d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 3s.
NAPHTHA.—Solvent, 90/160°, 1s. 8d. to 1s. 9d. per gal; solvent, 95/160°, 1s. 10d. to 1s. 11d., naked at works; heavy, 90/190°, 1s. 4d. to 1s. 5d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 6½d. to 1s. 9d. per gal.
NAPHTHALENE.—Crude, whizzed or hot pressed, £8 15s. to £10 15s. per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £17 to £18.
PITCH.—Medium, soft, 32s. 6d. per ton, f.o.b. MANCHESTER: 37s. 6d., f.o.b. East Coast.
PYRIDINE.—90/140°, 17s. to 18s. 6d. per gal.; 90/160°, 14s. to 15s.; 90/180°, 3s. to 4s. 6d. per gal., f.o.b. MANCHESTER: 15s. 6d. to 19s. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 5d. to 2s. 7d., nominal. MANCHESTER: Pure, 2s. 7d. per gal., naked.
XYLOL.—Commercial, 2s. 6d. to 2s. 11d. per gal.; pure, 2s. 8d. to 3s. 2d. MANCHESTER: 2s. 6d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £8 per ton; grey, £10 to £12. MANCHESTER: Grey, £14.
METHYL ACETONE.—40.50%, £35 to £38 per ton.
WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.
WOOD TAR.—£4 to £5 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.
BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL 34/35° C.— 1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.
DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100%, d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.
o-NITRANILINE.—4s. 3½d. per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
p-TOLUIDINE.—2s. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON, Dec. 9. To Dec. 31 (per ton, net, naked, ex works, mill or refinery, and subject to additional charges as to package and location of supplies).—LINSEED OIL, raw, £36 10s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £26; washed, £28 15s.; refined edible, £29 12s. 6d.; refined deodorised, £30 10s. SOYA BEAN OIL, crude, £27; refined deodorised, £31. COCONUT OIL, crude, £22 2s. 6d.; refined deodorised, £25 7s. 6d. PALM KERNEL OIL, crude, £21 10s.; refined deodorised, £24 15s. PALM OIL, refined deodorised, £27. GROUNDNUT OIL, crude, £29 10s.; refined deodorised, £34. WHALE OIL, crude, hardened 42 deg., £24 10s.; refined hardened 42 deg., £27. ACID OILS.—Groundnut, £20; soya, £18; coconut and palm kernel, £18 10s. Non-controlled commodities were nominally unaltered. ROSIN, 25s. to 35s. per cwt., according to grade. TURPENTINE, 59s. 6d. per cwt. spot, American, ex wharf, barrels, including tax and ex discount.

Commercial Intelligence

The following are taken from printed reports. but we cannot be responsible for errors that may occur.

Companies Winding-Up Voluntarily

LIGHTPLASTICS, LIMITED. (C.W.U.V., 16/12/39.) Creditors claims by December 30 to Robert Howie Porter, F.C.A., 90 Gresham House, Old Broad Street, London, E.C.2, liquidator of the company.

THE IRISH OCHRE AND MINERALS COMPANY (1915), LIMITED (C.W.U.V., 16/12/39.) General Meeting of Members 1 Broad Street Place, London, E.C.2, on Monday, January 22, 1940, at 12.30.

County Court Judgment

WHITTAKER HOWARTH, LTD. (C.C., 16/12/39.) R.O., Bury Road, Radcliffe, manufacturing chemists. £17 12s. 3d. November 10.

Receivers Ceasing to Act

" DURO " (ALL BRITISH) PRODUCTS, LTD., London, S.W., varnish and paint manufacturers. (R.C.A., 16/12/29.) H. A. Leach. November 29.

G. T. MEGGISON (BRADFORD), LTD., paint and varnish merchants. (R.C.A., 16/12/39.) J. W. Hellowell. November 20.

Company News

Boots Pure Drug Co., have declared a dividend of 6 per cent., less tax, for the quarter ending December 31, to be paid on December 30.

South African Druggists have declared a dividend of 5 per cent. on ordinary shares (against 7½ per cent. actual for previous seven months).

British Celanese, Ltd., report that in the year to July 1 last trading profits rose from £1,939,468 to £2,100,881. Other income was up from £11,214 to £16,917, and in addition a reserve of £16,000 no longer required is credited. Sales and administrative expenses, etc., absorb £1,053,294, against £1,068,902, while the proportion of research and advertising expenditure written off is lower at £207,624, compared with £248,670. The depreciation provision is increased from £346,394 to £353,600, and debenture charge require £185,994, against £193,793. Tax and N.D.C. absorb £165,000, against only £2,000, leaving net earnings £64,521 higher at £94,302. The carry-forward is increased from £259,692 to £353,994.

New Companies Registered

Brimsdown Lead Company. (357,866).—Private company. Nominal capital, £100 in 100 shares of £1 each. To carry on the business of manufacturers of and dealers in lead, white lead, lead oxides, lead fritt, bisilicate paint, varnish oils, pigments, etc. Subscribers: Frank Hopton, G. H. Woodcock. Solicitors: Linklaters and Paines, 2 Bond Court, Walbrook, E.C.4. Registered office, Ibex House, Minories, E.C.3.

Potash, Ltd. (357,643).—Private company. Capital, £10,000 in £1 shares. To carry on the business of chemists, importers, exporters, manufacturers and refiners of and dealers in chemical, industrial and other preparations, potash salts and fertilisers, etc. Subscribers: Geo. G. Buckeridge, 3/4 Clements Inn, W.C.2, solicitor; Elsie Hoare. Solicitors: Buckeridge & Braune, 3/4 Clements Inn, W.C.2.

Radionic Products (London), Ltd. (357,582).—Private company. Capital, £2,000 in 2,000 shares of £1 each. To carry on the business of manufacturers, primarily from compound chemicals of a luminous nature, paint, plastic shapes, luminous powder, printing inks and spraying substances, etc. Directors: Horace V. Hull, Anthony Riley, Clifford P. F. Watson. Secretary: H. V. Hull. Registered office: 14-16 Regent Street (Room 12), S.W.1.

British Luminophores, Ltd. (357,466).—Private company. Capital: £100 in 100 shares of £1 each. To carry on the business of manufacturers of and dealers in chemicals, gases, drugs, medicines, fertilisers, salts, acids, oils, colours, gums, pigments, paints, luminiscent and fluorescent powders and liquids, etc. Subscribers: Elizabeth F. Jenkins; Alan H. Slatford. Secretary: Alan H. Slatford. Registered office: 9 Drapers Gardens, E.C.2.

J. W. Thompson (Asbestos), Ltd. (357,854).—Private company. Capital, £1,000 in 1,000 ordinary shares of £1 each. To acquire the business of an engineer carried on in Birmingham by J. W. Thompson, and to carry on the business of refrigeration and cold storage engineers, manufacturers of equipment, chemicals and compositions of all kinds concerned with refrigeration and cold storage, etc. Directors: John W. Thompson, 41 Bellwood Road, Northfield, Birmingham, insulating engineer.; Mrs. Jane Thompson.

Colour Tars, Ltd. (357,539).—Private company. Capital £2,500 in 2,000 ordinary shares of £1 each and 2,000 founders shares of 5s. each. To carry on the business of manufacturers of and dealers in liquid cements, cement powders, filling materials, liquid, coloured and transparent tars, coloured and uncoloured mineral powders, luminous paints and powders, paints, colours, dyes and dyestuffs, stains, distempers, whitewashes, preservatives for wood, etc. Directors: Harry Harris, David Boyd. Subscribers: Mrs. Mary E. Harris, Edna M. Harris, Margaret A. Harris, and Mrs. Mary M. C. Walker, all of 5 Lydford Road, N.W.2. Solicitors: Sandom, Keersey and Tilleards, 12 Deptford High Street, S.E.8.

Chemical and Allied Stocks and Shares

ABSENCE of improvement of business has been reflected by slightly lower prices in most sections of the Stock Exchange, but the undertone remained steady, although sentiment was affected to some extent by the view that market conditions may not show any important change until after the turn of the year.

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As compared with a week ago Imperial Chemical have gone back from 30s. 6d. to 29s. 10½d., but the preference units were well maintained at 31s. 3d. Fison Packard were inactive, and continued to be quoted at 36s. 3d., and B. Laporte remained at 57s. 6d., but the price was apparently not tested by business. Monsanto Chemicals 5½ per cent. preference kept at 21s. 3d. and Lawes Chemical 10s. shares transferred at 8s. 9d. at one time, while Greeff Chemicals Holdings 5s. shares changed hands at 5s. 9d. British Glues 4s. ordinary, which last year received a dividend of 10 per cent., were around 5s. 4½d., and British Drug Houses 21s. 3d.

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British Match were lower at 32s., and Swedish Match, which were again affected by European political developments, have been marked down to 12s. Lever and Unilever, however, were slightly better at 30s. 9d., but Lever N.V. moved down moderately to 29s. 3d. British Oil and Cake Mills preferred ordinary have been marked up from 37s. 6d. to 39s. 3d., and United Premier Oil and Cake were maintained at 8s. Borax Consolidated were a steady feature at 25s. 3d. Imperial Smelting remained at 10s. 6d., while General Refractories tended to benefit from the market view that the company's earnings are probably running at an improved level, and have been rather more active at around 9s. 9d. Business in Morgan Crucible 5 per cent. preference was recorded at 21s. 9d. Erinoid improved to 3s. 6d., but no movements were shown in shares of other companies connected with the plastics industry.

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Pinchin Johnson were lower at 19s. 3d. International Paint kept at 73s. 1½d., and Goodlass Wall were again around 9s. On the other hand, Wall Paper deferred were lowered to 18s. 6d. Following publication of the results, British Tar Products have continued to be quoted at 6s. 3d. United Molasses were firm and made the slightly better price of 25s. 4½d., but Distillers at 64s. showed a moderately reactionary trend. Turner and Newall continued fairly steady around 73s. awaiting the results. International Combustion and R. A. Lister shares were also steady in advance of the dividend announcements. Dunlop Rubber were active around 27s. 6d. aided by the more encouraging view of dividend prospects now current in the market. There was a good deal of activity in British Oxygen around 71s. 3d., but British Aluminium were easier at 50s. On the other hand, Murex improved to 75s. and Triplex Glass maintained the steadier tendency which developed recently, the quotation being 20s. 6d. Movements in iron, steel and kindred securities were small and unimportant; Dorman Long were lower at 23s. 9d., and Stewarts and Lloyds had a more active appearance at 41s. 9d. Babcock and Wilcox were higher at 40s. 7½d., while Tube Investments, which remained under the influence of the statements at the recent meeting, moved up to 88s. Courtaulds were again higher, and British Celanese were active on the annual meeting.

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Boots Drug transferred around 39s. 6d., and Beechams Pills 2s. 6d. deferred, which the market is hopeful may receive a total dividend of 25 per cent. for the year, were steady at 8s. Sangers had a firmer appearance at 20s. 3d., and Timothy Whites were 22s. 6d. Valor ordinary shares were better at 19s. 4½d. Metal Box ordinary were a steady feature at 77s.

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Among oil shares Lobitos at 38s. 1½d. and Anglo-Ecuadorian at 20s., were little changed, but Anglo-Iranian declined sharply, and reduced prices have been made by " Shell " and Trinidad Leaseholds, although subsequently a firmer tendency appeared to be developing.